

WHAT IS CLAIMED IS:

1           1.     A light-emitting device comprising:  
2                 a sapphire substrate; and  
3                 a light-emitting layer comprising  $\text{In}_x\text{Ga}_{1-x}\text{N}$ , wherein said  
4     light-emitting layer has an indium mole fraction X ranging from  
5     about 0.13 to about 0.18 and emits blue light.

1           2.     A light-emitting device according to claim 1,  
2     further comprising:  
3                 a buffer layer comprising AlN;  
4                 a first clad layer comprising n-GaN; and  
5                 a second clad layer comprising p-GaN doped with  
6     magnesium.

1           3.     A light-emitting device according to claim 2,  
2     further comprising:  
3                 a transparent electrode comprising gold disposed  
4     on said second clad layer; and  
5                 an electrode pad disposed on said first clad  
6     layer.

1           4.     A light-emitting device according to claim 2,  
2     further comprising:  
3                 an interposed layer comprising  $\text{Al}_x\text{In}_y\text{Ga}_{1-x-y}\text{N}$ ,  
4     wherein said interposed layer has a wide band gap, is doped

5 with an acceptor, and is interposed between said light-emitting  
6 layer and said second clad layer.

1 5. A light-emitting device according to claim 4,  
2 wherein said acceptor is a group IIA element.

1 6. A light-emitting device according to claim 4,  
2 wherein said acceptor is magnesium.

1 7. A light-emitting device comprising:  
2 a sapphire substrate; and  
3 a light-emitting layer comprising  $\text{In}_x\text{Ga}_{1-x}\text{N}$ , wherein said  
4 light emitting layer has an indium mole fraction X ranging from  
5 about 0.19 to about 0.26 and emits green light.

1 8. A light-emitting device according to claim 7,  
2 further comprising:  
3 a buffer layer comprising AlN;  
4 a first clad layer comprising n-GaN; and  
5 a second clad layer comprising p-GaN doped with  
6 magnesium.

1 9. A light-emitting device according to claim 8,  
2 further comprising:  
3 a transparent electrode comprising gold disposed

on said second clad layer; and

an electrode pad disposed on said first clad layer.

10. A light-emitting device according to claim 8, further comprising:

an interposed layer comprising  $\text{Al}_x\text{In}_y\text{Ga}_{1-x-y}\text{N}$ , wherein said interposed layer has a wide band gap, is doped with an acceptor, and is interposed between said light-emitting layer and said second clad layer.

11. A light-emitting device according to claim 10, wherein said acceptor is a group IIA element.

12. A light-emitting device according to claim 10, wherein said acceptor is magnesium.

13. A semiconductor light-emitting device comprising:  
a sapphire substrate; and  
a light-emitting layer comprising  $\text{In}_x\text{Ga}_{1-x}\text{N}$  with an indium mole fraction X and emitting light with a wavelength  $\lambda$ ;

wherein the indium mole fraction X and the wavelength  $\lambda$  of the emitted light approximately satisfy the following conditions:

9  $\lambda \text{ (nm)} = 1239.8/E_g \text{ (eV)}$   
10  $E_g = 3.4 * (1-X) + 1.95 * X - 4.26 * X * (1-X).$

1 14. A semiconductor light-emitting device according  
2 to claim 13, wherein the indium mole fraction X ranges from  
3 about 0.13 to about 0.18, and the light-emitting layer emits  
4 blue light.

1 15. A semiconductor light-emitting device according  
2 to claim 13, wherein the indium mole fraction X ranges from  
3 about 0.19 to about 0.26, and the light-emitting layer emits  
4 green light.

1 16. A semiconductor light-emitting device according  
2 to claim 13, further comprising:  
3 a buffer layer comprising AlN;  
4 a first clad layer comprising n-GaN; and  
5 a second clad layer comprising p-GaN doped with  
6 magnesium.

1 17. A semiconductor light-emitting device according  
2 to claim 16, further comprising:  
3 a transparent electrode comprising gold disposed  
4 on said second clad layer; and  
5 an electrode pad disposed on said first clad

6 layer.

1 18. A semiconductor light-emitting device according  
2 to claim 16, further comprising:

3 an interposed layer comprising  $\text{Al}_x\text{In}_y\text{Ga}_{1-x-y}\text{N}$ ,  
4 wherein said interposed layer has a wide band gap, is doped  
5 with an acceptor, and is interposed between said light-emitting  
6 layer and said second clad layer.

1 19. A light-emitting device according to claim 18,  
2 wherein said acceptor is a group IIA element.

1 20. A light-emitting device according to claim 18,  
2 wherein said acceptor is magnesium.

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